



## **DEPARTMENT OF THE INTERIOR**

### **Fish and Wildlife Service**

#### **50 CFR Part 17**

**[Docket No. FWS–R4–ES–2012–0006]**

**[4500030113]**

### **Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List the Eastern Diamondback Rattlesnake as Threatened**

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Notice of petition finding and initiation of status review.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), announce a 90-day finding on a petition to list the eastern diamondback rattlesnake (*Crotalus adamanteus*) as threatened under the Endangered Species Act of 1973, as amended (Act) and to designate critical habitat. Based on our review, we find that the petition presents substantial scientific or commercial information indicating that listing the eastern diamondback

rattlesnake may be warranted. Therefore, with the publication of this notice, we are initiating a review of the status of the species to determine if listing the eastern diamondback rattlesnake is warranted. To ensure that this status review is comprehensive, we are requesting scientific and commercial data and other information regarding this species. Based on the status review, we will issue a 12-month finding on the petition, which will address whether the petitioned action is warranted, as provided in section 4(b)(3)(B) of the Act.

**DATES:** To allow us adequate time to conduct this review, we request that we receive information on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The deadline for submitting an electronic comment using the Federal eRulemaking Portal (see **ADDRESSES** section, below) is 11:59 p.m. Eastern Time on this date. After [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], you must submit information directly to the Field Office (see **FOR FURTHER INFORMATION CONTACT** section below). Please note that we might not be able to address or incorporate information that we receive after the above requested date.

**ADDRESSES:** You may submit information by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal:

*<http://www.regulations.gov>*. In the Enter Keyword or ID box, enter Docket No. FWS–R4–ES-2012-0006 which is the docket number for this action. Then click on the Search button. You may submit a comment by clicking on “Send a Comment or Submission.”

(2) *By hard copy*: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R4–ES–2012–0006; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

We request that you send comments **only** by the methods described above. We will post all information we receive on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see the **Request for Information** section below for more details).

**FOR FURTHER INFORMATION CONTACT:** Don Imm, Field Supervisor, U.S. Fish and Wildlife Service, Panama City, FL, Ecological Services Field Office, 1601 Balboa Avenue, Panama City, FL 32405; telephone 850–769–0552; facsimile 850–763–2177. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

## **SUPPLEMENTARY INFORMATION:**

### **Request for Information**

When we make a finding that a petition presents substantial information indicating that listing a species may be warranted, we are required to promptly review the status of the species (status review). For the status review to be complete and based on the best available scientific and commercial information, we request information on the

eastern diamondback rattlesnake from governmental agencies, Native American tribes, the scientific community, industry, and any other interested parties. We seek information on:

(1) The species' biology, range, and population trends, including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy throughout its entire range both historical and current;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for the species, its habitat, or both.

(2) The factors that are the basis for making a listing determination for a species under section 4(a) of the Act (16 U.S.C. 1531 *et seq.*), which are:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range;

(b) Overutilization for commercial, recreational, scientific, or educational purposes;

(c) Disease or predation;

(d) The inadequacy of existing regulatory mechanisms; or

(e) Other natural or manmade factors affecting its continued existence.

(3) Information related to whether any portion of the species' range should be considered for listing as a distinct population segment.

(4) Information on specific activities that could be affected or issues caused by listing the species.

If, after the status review, we determine that listing the eastern diamondback rattlesnake is warranted, we will propose critical habitat (see definition in section 3(5)(A) of the Act) under section 4 of the Act, to the maximum extent prudent and determinable at the time we propose to list the species. Therefore, we also request data and information on:

(1) What may constitute “physical or biological features essential to the conservation of the species,” within the geographical range currently occupied by the species;

(2) Where these features are currently found;

(3) Whether any of these features may require special management considerations or protection;

(4) Specific areas outside the geographical area occupied by the species that are “essential for the conservation of the species;” and

(5) What, if any, critical habitat you think we should propose for designation if the species is proposed for listing, and why such habitat meets the requirements of section 4 of the Act.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Submissions merely stating support for or opposition to the action under

consideration without providing supporting information, although noted, will not be considered in making a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or threatened species must be made “solely on the basis of the best scientific and commercial data available.”

You may submit your information concerning this status review by one of the methods listed in the **ADDRESSES** section. If you submit information via <http://www.regulations.gov>, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on <http://www.regulations.gov>.

Information and supporting documentation that we received and used in preparing this finding is available for you to review at <http://www.regulations.gov>, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Panama City Ecological Services Field Office, FL (see **FOR FURTHER INFORMATION CONTACT**).

### **Background**

Section 4(b)(3)(A) of the Act requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial

information indicating that the petitioned action may be warranted. We are to base this finding on information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish our notice of the finding promptly in the **Federal Register**.

Our standard for substantial scientific or commercial information within the Code of Federal Regulations (CFR) with regard to a 90-day petition finding is “that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted” (50 CFR 424.14(b)). If we find that substantial scientific or commercial information was presented, we are required to promptly conduct a species status review, which we subsequently summarize in our 12-month finding.

#### *Petition History*

On August 29, 2011, we received a petition dated August 22, 2011, from Collette L. Adkins Giese, Herpetofauna Staff Attorney, Center for Biological Diversity; D. Noah Greenwald, Endangered Species Program Director, Center for Biological Diversity; D. Bruce Means, PhD, President and Executive Director, Coastal Plains Institute; Bill Matturro, Protect All Living Species; and Jim Ries, One More Generation (petitioners), requesting that the eastern diamondback rattlesnake be listed as a threatened species and that critical habitat be designated under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioners required at

50 CFR 424.14(a). In a September 26, 2011, letter to the petitioners, we acknowledged receipt of the petition. On December 11, 2011, we received, via email, a letter dated December 9, 2011, from the petitioners submitting information to amend the petition with new information regarding climate change. In a December 12, 2011, email to the petitioners, we acknowledged receipt of the new information. This finding addresses the petition.

#### *Previous Federal Action(s)*

There are no previous Federal actions concerning the eastern diamondback rattlesnake under the Act.

#### *Species Information*

The eastern diamondback rattlesnake (*Crotalus adamanteus*) was described in 1799 by Beauvois (Transactions of the American Philosophical Society, Vol. 4 (1799), pp. 362–381). The Florida Museum of Natural History website 2011 (<http://www.flmnh.ufl.edu/herpetology/fl-guide/crotalusadamanteus.htm>) lists *Crotalus durissus* as a synonym by Boulenger (1896). This synonym was not found in other taxonomic treatments of the species or in the information available to the Service at the time of this finding. No other taxonomic history other than *C. adamanteus* was found during the course of this finding. The eastern diamondback is recognized as a valid species in the Checklist of Vertebrates of the United States, the U.S. Territories, and



Canada (ITIS) (retrieved November 9, 2011, from the Integrated Taxonomic Information System on-line database). Therefore, we accept the taxonomic description of the eastern diamondback as *Crotalus adamanteus*.

The eastern diamondback rattlesnake is recognized by its large size, diamond-patterned dorsal (upper) side, yellowish unpatterned underbelly, dark tail with rattle, and infrared sensitive pit between the eye and nostril (Timmerman and Martin 2003, p. 2). The eastern diamondback is the largest rattlesnake in the world (Timmerman and Martin 2003, p. 1). Adult snakes average 4 to 5 feet (ft) (1.2 to 1.5 meters (m)) in length and average 4 to 5 pounds (lbs) (1.8 to 2.3 kilograms (kg)) in weight. Eastern diamondbacks in the 6–ft (1.8–m) range are considered quite large and can reach 12 lbs (5.4 kg) or more (Timmerman and Martin 2003, p. 2).

The historical (pre-European settlement or presettlement) range of the eastern diamondback rattlesnake encompasses the Coastal Plain of the southeastern United States from North Carolina to south Florida, and west to Mississippi and Louisiana (Mount 1975, Dundee and Rossman 1989, Palmer and Braswell 1995, Ernst and Ernst 2003, and Campbell and Lamar 2004 as cited in the petition on p. 9). At the broadest spatial scale, the historical range of the eastern diamondback is largely congruent with the historical distribution of the longleaf pine savanna ecosystem (Martin and Means 2000, p. 20; Waldron *et al.* 2008, p. 2478).

The principal native habitat of the eastern diamondback rattlesnake in

presettlement times was longleaf pine savannas (Martin and Means 2000, p. 20).

Longleaf pine savannas once occupied about 62 percent of the uplands of the Coastal Plain and about 40 percent of the regional landscape (Petition, p. 13). Today, nearly all of the old growth longleaf pine savannas are gone, and the eastern diamondback survives wherever its native habitats still exist or where open-canopy, ruderal forests and grasslands that mimic the native vegetation have developed (Petition, p. 12). The remaining principal large tracts of second growth longleaf pine are found on publically owned lands in the Coastal Plain, especially national forests, military bases, State forests and parks, and a few wildlife refuges (Means 2005, p. 76).

Longleaf pine savannas are maintained by frequent fires. Naturally ignited by lightning during spring and early summer, these flatwoods historically burned at intervals ranging from 1 to 4 years (Clewell 1989, p. 226).

Shelters from fire and cold are important microhabitats for the eastern diamondback rattlesnake (Martin and Means 2000, p. 18). Eastern diamondbacks seek subterranean overwintering shelters throughout their range with the exception of extreme southern Florida and the Florida Keys (Timmerman and Martin 2003, p. 8). They also use gopher tortoise (*Gopherus polyphemus*) and armadillo (*Dasypus novemcinctus*) burrows as well as fire-burned pine stumpholes and cavities at the bases of hardwood trees (Timmerman and Martin 2003, p. 8; Means 2005, p. 74).

The natural lifespan of an eastern diamondback rattlesnake is probably 15 to 20

years, but evidence from the field indicates that few individuals today live beyond 10 years, likely due to anthropogenic threats (Timmerman and Martin 2003, p. 15). Mating occurs in the late summer and early fall (Timmerman and Martin 2003, p. 15). Ovulation apparently occurs in the late spring of the following year with births centered in late August and ranging from late July to early October (Timmerman and Martin 2003, p. 15). Female eastern diamondbacks reach sexual maturity between 2 to 6 years of age (Timmerman and Martin 2003, p. 16). Eastern diamondbacks have long birth intervals and gestational periods; females reproduce only every 2 to 4 years, depending on the geographic location, age of the snake, and productivity of the environment (Petition, p. 14).

The eastern diamondback rattlesnake is an ambush predator that feeds on a wide variety of small mammals and some birds (Timmerman and Martin 2003, p. 6). The bulk of its prey consists of rabbits (*Sylvilagus* sp.), cotton rats (*Sigmodon hispidus*), and gray squirrels (*Sciurus carolinensis*) (Timmerman and Martin 2003, p. 6). The open-canopy habitats of the eastern diamondback favor the development of an herbaceous groundcover on which its primary prey depend (Petition, p. 12). The eastern diamondback is terrestrial, hunting almost exclusively on the ground (Timmerman and Martin 2003, p. 6). As a member of the pit viper family, it is able to hunt in total darkness and identify warm-blooded prey via infrared detection (Timmerman and Martin 2003, p. 6). Timmerman (Petition, p. 14) found that home ranges for females averaged 114.9 acres (ac) (46.5 hectares (ha)), home ranges for males averaged 208.3 ac (84.3 ha), and that the species does not defend a territory. Eastern diamondbacks do not den communally

(Means 2009, p. 138).

The species has likely been declining since the 1930s (Timmerman and Martin 2003, p. 19). The greatest population decline of eastern diamondback rattlesnakes has occurred since the 1970s, as the human population grew in the southeastern United States (Timmerman and Martin 2003, p. 19). The area of occupancy, number of subpopulations, and population size of the eastern diamondback is declining throughout the species' range (Nature Serve 2010 as cited in the petition on p. 9). The range has contracted because of habitat loss from agriculture, silviculture, urbanization, and plant succession resulting from fire suppression (Timmerman and Martin 2003, p. 9). Remaining intact range supporting large populations of the eastern diamondback is now located only in northern Florida and southern Georgia (Martin and Means 2000, p. 21). The species is likely gone from Louisiana, endangered in North Carolina, and scarce in South Carolina (Dundee and Rossman 1989; Palmer and Braswell 1995; Georgia DNR 2011; and Means 2011 as cited in the petition on p. 9).

There are other indicators of the eastern diamondback rattlesnake's decline from collection for anti-venom production, commercial sale of skin and other parts, and supplying rattlesnake roundups. Size records for thousands of eastern diamondbacks purchased by the Ross Allen Reptile Institute demonstrate that the average snake length dropped by about a foot (30.5 centimeters) between the 1930s and 1960s (Diemer–Berish 1998, p. 556; Timmerman and Martin 2003, p. 19).

The size and numbers of eastern diamondback rattlesnakes collected at “rattlesnake roundups” also provides an indicator of population status (Means 2009, p. 134). Since at least the mid–1980s, a steady decline is evident for the weights of prize-winning eastern diamondbacks collected in all four roundups in the southeastern United States (Means 2006, p. 170–171; Means 2009, p. 134). Declining size means fewer older snakes and, therefore, has negative implications for the reproductive success of local populations (Means 2009, p. 137). Heavily harvested populations are skewed to smaller and less productive animals (Enge 1993, p. 412), as clutch size is correlated with the body size of the mother (Petition, p. 15).

There has also been a decline in the numbers of eastern diamondback rattlesnakes brought into the roundups (Timmerman and Martin 2003, p. 19; Means 2009, p. 134). The number of snakes brought into the Whigham, Georgia, roundup in January 2011 was the lowest number in the history of the event, at 82 snakes, down from a high of 583 in 1992.

### **Evaluation of Information for this Finding**

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR 424 set forth the procedures for adding a species to, or removing a species from, the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five

factors described in section 4(a)(1) of the Act:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In considering what factors might constitute threats; we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species so that the species may warrant listing as threatened or endangered as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively may not be sufficient to compel a finding that listing may be warranted. The information shall contain evidence sufficient to suggest that these factors may be operative threats that act on the species to the point that the species may meet the definition of threatened or endangered under the

Act.

In making this 90-day finding, we evaluated whether information regarding threats to the eastern diamondback rattlesnake, as presented in the petition and other information available in our files, is substantial, thereby indicating that the petitioned action may be warranted. Our evaluation of this information is presented below.

*A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range*

Information Provided in the Petition

The petition discusses the correlation between the status and condition of open-canopy longleaf–pine savannas and the status of the eastern diamondback rattlesnake. According to the petition, in presettlement times, the eastern diamondback thrived in the longleaf pine savannas that covered the southeastern United States. But today, less than two or three percent of the longleaf pine savanna habitat remains (Noss *et al.* 1995, p. 3; Platt 1999 p. 24; Martin and Means 2000, p. 20). The presettlement population of the eastern diamondback has been estimated to be about 3.08 million individuals (Petition, p. 14), but the petition acknowledges that no sound baseline information exists (Timmerman and Martin 2003, p. 19). It is unlikely that the current population exceeds 100,000 snakes (Means 2011 as cited in the petition on p. 15). Thus, the petition indicates that, as in the longleaf pine savannas reduction, it is possible that the current population of the eastern diamondback is about 3 percent of the historical population (Petition, p. 16).

The petition provides that, while the eastern diamondback rattlesnake does not require longleaf pine savannas to survive, it does require open-canopy habitats that provide herbaceous groundcover for its prey species (Means 2011 as cited in the petition on p. 16). Open-canopy habitats are becoming increasingly rare, as forests are being converted into closed-canopy pine plantations, residential and commercial developments, and agriculture (Petition, p. 16). The petition asserts that there is significant agreement among scientists that the destruction of longleaf pine savannas and open-canopy forest is the single most important factor affecting the survival of the eastern diamondback (Martin and Means 2000, p. 21; Timmerman and Martin 2003, p. 21; Waldron *et al.* 2006, p. 419; Waldron *et al.* 2008, p. 2478; Means 2011 as cited in the petition on p. 16). The petition summarizes the current status of the eastern diamondback in the southeastern United States.

In North Carolina, the eastern diamondback rattlesnake is now restricted to the Lower Coastal Plain south of the Neuse River (Martin and Means 2000, p. 17; NatureServe 2010 as cited in the petition on p. 9). The eastern diamondback was once known to occupy Croatan National Forest, but it has not been documented on any lands in the State managed by the U. S. Forest Service, National Park Service, or U.S. Fish and Wildlife Service in the last 10 years (Petition, p. 11).

In South Carolina, the eastern diamondback rattlesnake is patchily distributed where it occurs in undeveloped areas on the Lower and Middle Coastal Plain and on



Edisto Island and three smaller barrier islands (Martin and Means 2000, p. 17; NatureServe 2010 as cited in the petition on p. 11). South Carolina has numerous National Park Service lands and National Wildlife Refuges within the historical range of the eastern diamondback, however, only the Ace Basin National Wildlife Refuge has any records of the snake from the last 10 years (Petition, p. 11).

In Georgia, the extent of the current range of the eastern diamondback rattlesnake is probably essentially unchanged from presettlement times and includes the Coastal Strand and Barrier Island region of the Atlantic coast (Martin and Means 2000, p. 14). However, much of the habitat within the range has been lost to development, hurricanes, or absence of shelter (hardwood stumps), and its distribution is highly fragmented (Martin and Means 2000, pp. 16–17).

In Florida, the eastern diamondback has become rare or disappeared completely from many sites within its historical range that was essentially statewide, including barrier islands and keys (Martin and Means 2000, pp. 15–16). Much of the species' habitat has been lost to urbanization and conversion to citrus groves and improved pasture in the Florida peninsula during the last half of the twentieth century (Martin and Means 2000, p. 15). Florida encompasses half of the species' current range (Timmerman and Martin 2003, p. 41).

In Alabama, the eastern diamondback rattlesnake occurs in the Lower Coastal Plain where longleaf pine and wiregrass originally dominated the uplands (NatureServe

2010 as cited in the petition p. 12). It is found primarily in the southwestern part of the State, in southern Washington and northern Mobile Counties, Alabama (Martin and Means 2000, p. 13; Timmerman and Martin 2003, p. 9). The only Federal land in Alabama with a record of the eastern diamondback within the last 10 years is the Bon Secour National Wildlife Refuge (NatureServe 2010 as cited in the petition on p. 12).

In Mississippi, the eastern diamondback rattlesnake may have ranged to the limits of the State's longleaf pine forest, but was not known to occur on barrier islands (NatureServe 2010 as cited in the petition on p. 12). Today, the species is uncommon because its habitat is being converted to agriculture and it is hunted for the roundup at the City of Opp, Alabama, and the skin trade. Its range is now being confined mainly to the longleaf pine hills and pine flats regions (Martin and Means 2000, pp. 13–14; Timmerman and Martin 2003, p. 43; NatureServe 2010 as cited in the petition on p. 12). The three national wildlife refuges in the State within the historical range of the species lack any records of the eastern diamond back from the last 10 years (Petition, p. 12).

In Louisiana, the eastern diamondback rattlesnake was historically confined to the eastern-most three of the seven Florida parishes (the area of Louisiana north of Lake Pontchartrain, east of the Mississippi River and Bayou Manchac and south of the Mississippi border) and was never reported from the barrier islands (NatureServe 2010 as cited in the petition p. 12). The eastern diamondback is likely extirpated in Louisiana. It is possible that the species may exist in extreme northeastern Louisiana, but is so rare that it is functionally extinct (Martin and Means 2000, p. 11; Timmerman and Martin 2003,

pp. 9, 20, 43). The snake was last observed in Louisiana in 1995 (Louisiana Department of Fisheries and Wildlife 2010 website <http://www.wlf.louisiana.gov/serpentes/eastern-diamondback-rattlesnake> as cited in the petition on p. 12).

The petition also asserts that the quality of the open-canopy and longleaf pine savannas has declined this being mainly due to the absence of fire (Petition, p. 13). Without active fire management, remnant longleaf pine ecosystems convert to closed-canopy forests and become unsuitable for snakes such as the eastern diamondback (Petition, pp. 13, 16). In presettlement times, lightning-caused fires burned on average every 1 to 4 years, keeping the canopy open. However, in the past 200 years, human settlement of the Coastal Plain has drastically altered the normal, summertime fire cycle. Not only have wildfires been actively suppressed following ignition, but roads, towns, agricultural fields, and other developments impede the widespread, weeks-long fires that swept the Coastal Plain regularly in presettlement times (Means 2011 as cited in the petition on p. 16 ). The disruption of the natural fire cycle has resulted in an increase in slash and loblolly pine on sites formerly dominated by longleaf pine, an increase in hardwood understory, and a decrease in herbaceous ground cover (Wolfe *et al.* 1988, p. 132; Yager *et al.* 2007, p. 428).

#### Evaluation of Information Provided in the Petition and Available in Service Files

The petition states that the species' range reduction, habitat loss and degradation, and lack of fire are contributing heavily to the population reduction of the eastern diamondback rattlesnake. The petition asserts that remaining population size of the

eastern diamondback of three percent corresponds to the amount of remaining historical longleaf pine savanna habitat of two to three percent. Similar information concerning the life history, status, and distribution of the eastern diamondback and availability of suitable habitat (longleaf pine savannas and open-canopy forests) is also found in the Service's files (Timmerman and Means 2003, entire; America's Longleaf Regional Working Group 2009, entire). The Region-wide Conservation Plan for Longleaf states that longleaf pine forests are a remnant of their former 90 million ac (36.4 million ha) (America's Longleaf Regional Working Group 2009, p. 1). As indicated in the petition, less than three percent or an estimated 3.4 million ac (1.4 million ha) remain (America's Longleaf Regional Working Group 2009, p. 1) of longleaf forests. Fragmentation, unsustainable harvest, conversion to other land uses and vegetative types, invasive species, and exclusion of natural fire regimes have cumulatively resulted in declines in the extent, condition, and future sustainability of the system. The loss of 97 percent of the longleaf forests is a dramatic change in the landscape. While no discussion of the eastern diamondback is provided in the Conservation Plan, the species is listed as a species of conservation interest in the longleaf pine ecosystem (America's Longleaf Regional Working Group 2009, pp. 41–42).

Prescribed burning has been a tool used on forested lands to restore the natural fire regime, but liability, reduced budgets, unfavorable weather, and backlogged, dangerously high fuel loads from years of fire suppression have allowed the quality of habitat maintained by fires to degrade and become less or, in many cases, unsuitable for the eastern diamondback rattlesnake (Wade and Lundsford 1989, pp. 1–2; Kaufman *et al.*

undated, pp. 2, 4–8).

In summary, we find that the information presented in the petition, as well as the information available in our files, presents substantial scientific or commercial information indicating that the petitioned action may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range primarily as a result of the conversion of natural pine habitat to silviculture, agriculture, urbanization, and to fire suppression.

*B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.*

Information Provided in the Petition

According to the petition, eastern diamondback rattlesnakes are harvested for their skins and other parts including venom, and are killed for recreation (Martin and Means 2000, p. 21; Means 2009, p. 139; Means 2011 as cited in the petition on p. 19). This exploitation by humans is having a severe impact on remaining eastern diamondback rattlesnake populations (Martin and Means 2000, p. 21; Means 2009, p. 139; Means 2011 as cited in the petition on p. 19). Various markets for eastern diamondback rattlesnakes have existed for decades (Petition, p. 19). The rattlesnake skin trade likely takes thousands of eastern diamondbacks each year, with no limit placed on annual harvest (Timmerman and Martin 2003, p. 22). From 1990 to 1994, Florida hide dealers and taxidermists purchased 42,788 eastern diamondbacks, primarily from Georgia, Alabama, and Florida (Timmerman and Martin 2003, p. 40).

According to the petition, intensive collection of rattlesnakes for “rattlesnake roundups” is affecting the eastern diamondback rattlesnake (Diemer–Berish 1998, p. 556). In rattlesnake roundups, rattlesnakes are collected in competitions for prizes (Timmerman and Martin 2003, p. 22). Some of the snakes including eastern diamondbacks are then sold for skins and other parts. Means (2009, p. 132) analyzed 50 years of data for the longest running roundups involving the eastern diamondback. At least 23 roundups were held for the purpose of downsizing the population of the eastern diamondback (Petition, p. 20). Hunters that gather rattlesnakes for roundups often use the practice of pouring gasoline or ammonia through a hose placed inside the burrows of gopher tortoises in winter (Petition, p. 20). This practice often kills the snakes and impacts other fauna inhabiting the burrows (Petition 2011, p. 20). Means (as cited in the petition on p. 20) also found that the total number of captured rattlesnakes declined by 67 percent in the last two decades. Thus, the petition asserts that the numbers of snakes collected for rattlesnake roundups likely are an underestimate of the number of snakes actually killed by hunters (Petition, p. 20).

The petition stated that eastern diamondback rattlesnakes are also taken for venom extraction. The Ross Allen Reptile Institute purchased and supplied most of the venom to U.S. laboratories during the development of anti-venom from 1929 to 1940, and for the production of anti-venom during World War II (Petition, p. 20). Other laboratories have also purchased thousands of eastern diamondbacks for the purpose of venom extraction (Petition, p. 20).

## Evaluation of Information Provided in the Petition and Available in Service Files

Information concerning the harvest of eastern diamondback rattlesnakes similar to that presented in the petition is found in Service files. Since the 1930s there has been a variety of markets for the eastern diamondback. The snake's meat has been used as a food delicacy, skins for clothing, parts for curio trade, venom for human safety, and they have been sold at festivals or events for recreation and tourism (Timmerman and Martin 2003, pp. 21–22). In addition to the decline in the capture rate of snakes (harvest and research) and the potential reasons for the decline (fewer snakes, market changes, and regulation), the effects to eastern diamondback populations include the disappearance of larger eastern diamondbacks and increased capture of smaller diamondbacks (Timmerman and Martin 2003, pp. 19–20).

In summary, we find that the information presented in the petition, as well as the information available in our files, presents substantial scientific or commercial information indicating that the petitioned action may be warranted due to the overutilization of the species for commercial, recreational, scientific, or educational purposes.

### *C. Disease or Predation.*

#### Information Provided in the Petition

The petition provides that the eastern diamondback rattlesnake has a long list of likely natural predators, including ungulates, raccoons, opossum, dogs, cats, raptors, storks, and other snakes (Timmerman and Martin 2003, p. 17; Means 2011 as cited in the petition on p. 21). However, natural predation does not appear to be a threat to the snake. In addition, the petition provides that disease does not appear to be a threat to the eastern diamondback and provided no additional information concerning the potential threat of diseases to the eastern diamondback (Petition, p. 21).

#### Evaluation of Information Provided in the Petition and Available in Service Files

Information concerning predation and diseases of the eastern diamondback rattlesnake in the Service's files is similar to the information presented in the petition. Young and adult eastern diamondbacks are preyed upon. According to Timmerman and Martin (2003, p. 17), there have been numerous species of wildlife implicated in the death of even the largest of rattlesnakes, including swine, raccoons, otters, dogs, cats, raptorial birds, storks, eastern indigo snakes, king snakes, black snakes, coral snakes, and the river frog (*Rana heckscheri*). A white-tailed deer was observed stomping a radio-tagged male eastern diamondback (Timmerman and Martin 2003, p. 17). However, the Service has no information in our files that indicates the level of impact resulting from predation by other wildlife (native and non-native) has resulted in population-level effects.

The petition does not provide any information about disease in eastern diamondback rattlesnakes. The Service has no information in our files on diseases that



affect or could affect the species. Wilson and Porras (1983 as cited in Timmerman and Martin 2003, p. 21) reported that the eastern diamondback was one of several south Florida species that were occasionally found emaciated and lethargic. The reasons were unknown, and specimens sent for pathological analysis turned up no evidence of bacteriological or parasitic infestation.

In summary, we find that the information presented in the petition, as well as the information available in our files, does not present substantial scientific or commercial information indicating that the petitioned action may be warranted due to disease or predation.

*D. The Inadequacy of Existing Regulatory Mechanisms.*

Information Provided in the Petition

The petition contends that populations of the eastern diamondback rattlesnake are closely correlated with the amount and condition of open-canopy pine, particularly longleaf pine forests. The petition states that the species' range reduction, habitat loss, and degradation are contributing heavily to the population reduction of the eastern diamondback. Approximately 34 percent of remaining longleaf pine habitats occur on federally owned lands, 11 percent occur on State or locally-owned lands, and 55 percent on privately owned lands (Means 2011 as cited in the petition on p. 22).

The petition presents information that the loss of longleaf pine savannas is the single most important factor affecting the survival of the eastern diamondback rattlesnake. While there are ongoing restoration efforts that vary in scale and land ownership, nearly all of the efforts are purely voluntary and without dedicated funding. Uncertainty remains as to whether these actions will continue in the future. In addition, the petition asserts that, none of the efforts to restore longleaf pine are specifically aimed at protecting eastern diamondbacks. They also assert that on Federal lands the conservation and restoration programs are not legally mandated or require monitoring to measure success of habitat improvements. The petition states as a consequence, because these regulatory mechanisms are lacking, they are inadequate and a threat to the eastern diamondback (Petition, pp. 22–23).

The petition also contends that habitat for the eastern diamondback rattlesnake is inadequately protected under State law or on State lands. The petitioners indicate they are unaware of any State regulations providing permitting oversight or requiring conservation benefit to eastern diamondbacks. The eastern diamondback receives some benefit from State regulations protecting gopher tortoise habitat, but only in Florida where there are some regulations (Petition, p. 24). Habitat on State-managed lands is protected in small amounts but is inadequate because the management actions are not conducted to specifically benefit the eastern diamondback (Petition, p. 24).

The petition indicates that the majority of remaining longleaf pine is on private lands, where habitat is being rapidly lost and not all regenerated to longleaf pine. Modest

conservation value is derived from voluntary participation with restoration programs. In addition to restoration, land acquisition programs are in place. While the eastern diamondback would likely benefit from these acquisitions, the amount of habitat that will be conserved and the distribution of extant diamondback populations on these properties is not known. The petition states that these efforts are purely voluntary and, therefore, are not adequate to protect the snakes (Petition, p. 24).

Regarding human exploitation, among the States, only North Carolina provides legal protection for the eastern diamondback rattlesnake where it is State-listed as endangered. The eastern diamondback is listed as a species of special concern in South Carolina, Alabama, and Florida, but the petition contends that these designations provide no legal or regulatory protection (Petition, p. 26). Georgia has a law that prohibits the taking of nongame wildlife, but venomous snakes are specifically excluded (Petition, p. 26). In other words, eastern diamondbacks are wholly unprotected in South Carolina, Georgia, Florida, Mississippi, Alabama, and Louisiana. According to the petition, unlimited numbers of the snakes may be killed in all but one of the seven States, and, therefore, the lack of regulatory mechanisms facilitates overexploitation of the species. The petition concludes that inadequacy is a factor threatening the species (Petition, pp. 26–27).

#### Evaluation of Information Provided in the Petition and Available in Service Files

##### *Federal Regulatory Mechanisms*

Federal lands within the historical range of the eastern diamondback rattlesnake are managed by the Department of the Interior (units of the National Park System, National Wildlife Refuges, and Bureau of Land Management (small areas)), Department of Agriculture (U.S. Forest Service), and Department of Defense (DOD) (U.S. Air Force, U.S. Army, and U.S. Navy). These Federal land owners or managers are tasked with implementing natural resource management plans that include conservation and restoration of habitats and species and regulation of activities related to agency mission, other land users, and visitors. As general conservation programs, these programs are adequate on Federal lands. However, threats to the eastern diamondback may remain because of lack of implementation, compliance, or enforcement or because these programs do not target conservation of the species. Lack of implementation or compliance may be a result of funding, work priorities, and staffing. The Service has no information concerning the implementation of the plans and enforcement of regulations protecting the snake from harm. Insufficient implementation or enforcement could become a threat to the species in the future if the species continues to decline in numbers on Federal lands. In addition, the Service is not aware that any of these Federal land programs have management actions geared specifically to benefit eastern diamondbacks.

Eastern diamondback rattlesnakes overlap suitable habitats with other federally protected species and derive conservation benefits through their protection. Eastern diamondbacks share suitable habitat with the eastern indigo snake (*Drymarchon couperi*) and the gopher tortoise. Indigo snakes are listed as threatened under the Act (January 31,

1978; 50 CFR part 17.11(h)). Gopher tortoises are listed as threatened under the Act in the western portion of their range (west of the Mobile and Tombigbee Rivers in Alabama, Mississippi, and Louisiana) (July 7, 1987; 50 CFR part 17.11(h)). No critical habitat is designated for either the indigo snake or the gopher tortoise listed in the western portion of its range.

### *State Regulatory Mechanisms*

The petition suggests that eastern diamondback rattlesnakes are protected by state law only in North Carolina (NC ST § 113–331–350) and are wholly unprotected in South Carolina, Georgia, Florida, Mississippi, Alabama, and Louisiana. This is not entirely accurate. State parks and other State lands are governed by regulations (which are based in State statutes) that protect the snake inasmuch as they protect all other species of wildlife. For example in State Parks in Florida, all plants, animals and park property are protected and their collection, destruction or disturbance of plants, animals or park property is prohibited (F.S. Chap. 258.008 (b) and (c)). In South Carolina, killing, harming, or harassing any mammal, bird, reptile, or amphibian, except by permit issued by the South Carolina Department of Natural Resources for designated Game Management Areas is unlawful (Title 51 – Parks, Recreation and Tourism, Chap. 3, State Parks, Sec. 51-3-145 (B)). In Georgia any person who hunts, traps, fishes, possesses, or transports wildlife in violation of the wildlife laws and regulations violates the conditions under which this right is extended; and any wildlife then on his person or within his immediate possession is deemed to be wildlife possessed in violation of the law and is

subject to seizure by the department pursuant to Georgia Code Section 27-1-21 (Georgia Code Section 27-1-3). On the other hand, if the rules do not result in compliance or are not adequately enforced, this could render the rules relatively inconsequential in providing real protection for the snake. The Service has no information concerning the compliance with or the enforcement of the State regulations.

While regulations to protect habitat and wildlife in general on Federal and State public lands do exist, almost none specifically target protection of the eastern diamondback rattlesnake. Approximately 45 percent of the snake's remaining habitat is under public ownership, and the remaining 55 percent of the habitat is on private lands.

#### *Private Lands*

Existing land use regulations on private lands within the eastern diamondback rattlesnake's historical range are implemented by the individual States and local governments. With the exception of North Carolina's State protection, the Service is aware of no regulatory mechanisms that are in place and specifically intended to protect the eastern diamondback. Projections of nationwide rural land development excluding Federal lands are largest in the Southeast at 15 percent (White *et al.* 2008, p. 10). The spatial arrangement of rural lands that are converted to developed uses, even for small areas, may magnify the ecological impacts from urbanization, including the loss of wildlife habitat (White *et al.* 2008, p. 10). Only in the last decade has the concept of green infrastructure that balances development and land protection (benefits wildlife like

the eastern diamondback) evolved from a novelty practice to a national planning method ([http://www.conservationfund.org/green\\_infrastructure](http://www.conservationfund.org/green_infrastructure)). This may be due in part to the scarcity of undeveloped land areas and the realization of their importance for ecological conservation (water quality, habitat, and wildlife), safety (wildfires), and the amenities afforded by living in close proximity to them (recreation, aesthetics, green space, and land values) (White *et al.* 2008, p. 11).

Long-term survival of the eastern diamondback rattlesnake will depend almost entirely upon lands set aside for conservation (Timmerman and Martin 2003, p. 41). The Service finds that there are regulatory mechanisms in place in the form of State and Federal regulations governing their respective owned and managed lands. However, implementation, compliance, or enforcement of the regulations is important to the conservation of the eastern diamondback and currently is unknown.

The petition suggests that there are no existing regulations that protect the eastern diamondback rattlesnake and thus regulatory mechanisms are inadequate by their absence. There are regulatory mechanisms in place on State and Federal lands that lend protection in general to all wildlife; while not specific to the eastern diamondback, they do provide protection to the species. Thus, there are existing regulatory mechanisms that protect the eastern diamondback contrary to the assertions in the petition. The implementation of, compliance with, and enforcement of those regulatory mechanisms are unknown.

Thus, the information provided in our files does not support the conclusion stated in the petition that there are no existing regulatory mechanisms to protect the eastern diamondback rattlesnake. However, the information in our files supports the conclusion that the existing regulatory mechanisms may be inadequate because there is no evidence that existing implementation of, compliance with, and enforcement of the mechanisms is effective in protecting the eastern diamondback on private, local, State, or Federal lands.

In summary, we find that the information provided in the petition and the Service's files provide substantial scientific or commercial information indicating that the petitioned action may be warranted due to the inadequacy of existing regulatory mechanisms that address threats to the eastern diamondback rattlesnake.

*E. Other Natural or Manmade Factors Affecting Its Continued Existence.*

Information Provided in the Petition

The petition asserts that human-caused climate change is a factor that may impact the eastern diamondback rattlesnake. The petition indicates that, because the species is restricted to coastal areas (0 to 1,640 ft (0 to 500 m) above sea level), rising sea levels due to climate change may inundate some habitat occupied by the species and the species may not be able to adapt to changes in the climate at a rate needed for survival. The petition also addresses possible threats to the eastern diamondback from pesticide use,



snakes killed out of fear, and the inadequate amount of prescribed fire to maintain good quality habitat. Each of these potential threats is addressed below.

An amendment to the petition provided a paper (Lawing and Polly 2011, entire) on rattlesnakes and climate change. Lawing and Polly (2011, p. 2) present that snakes are particularly useful for understanding the effects of climate change on terrestrial vertebrate species because their ectothermic (controlling body temperature by external means) physiology is highly dependent on the ambient temperature. Lawing and Polly (2011, p. 2) chose rattlesnakes for their climate modeling because the geographic distributions of some species extend north of former glacial margins, assuring that their geographic distributions have, in fact, changed over recent geological history. Climate models were examined predicting the probable suitable habitat at the year 2100, under a climate change increase of 1.1 degrees Centigrade (C) (34 degrees Fahrenheit (F)) and 6.4 degrees C (43.5 F). The models predict for the eastern diamondback rattlesnake a great reduction in suitable habitat availability by 2100 with an average change of 1.1 degrees C (34 degrees F), and zero suitable habitat availability by the year 2100 with an average increase of 6.4 degrees C (43.5 degrees F) (Lawing and Polly 2011, p. 11). The study essentially says that the eastern diamondback rattlesnake is one of these particularly sensitive species, and that the rate of climate change and the subsequent changes to suitable habitat will likely occur too quickly for the eastern diamondback rattlesnake to adapt and survive because suitable habitat will diminish significantly, and disappear altogether at the extreme change of 6.4 degrees C (43.5 F) by 2100 (Lawing and Polly 2011, p. 11).

The petition indicates that the eastern diamondback rattlesnake may be susceptible to pesticide poisoning, but the extent of this threat is unknown (Timmerman and Martin 2003, p. 21). No other information is provided in the petition relative to threats of pesticides on the snake.

The petition asserts that the eastern diamondback rattlesnake is one of the most heavily persecuted reptiles in the eastern United States (Timmerman and Martin 2003, p. 41). The eastern diamondback rattlesnake is feared by many people (as are snakes in general, venomous and non-venomous) and often are killed whenever and wherever they are encountered (Petition, p. 21). Human persecution is a primary threat to the eastern diamondback and has contributed significantly to the decline of the species (Petition, p. 21).

#### Evaluation of Information Provided in the Petition and in Service Files

The petition did not provide any information supporting the conclusion that pesticides are a current or potential threat to the eastern diamondback rattlesnake. The Service has no information in our files on pesticides and impacts to the eastern diamondback.

The petition presents documentation and other information about the killing of eastern diamondback rattlesnakes by humans out of fear, malice, adventure, and

excitement. The petition asserts that killing of this type has contributed significantly to the decline of the eastern diamondback. However, none of the information presented in the petition clearly distinguishes the difference between commercial collection or harvest and killing for other reasons and contribution to the species' decline. While the Service has no specific information in our files related to killing of eastern diamondbacks because of fear of or malice, we are cognizant of the public's concern about venomous animals in general and the responses to those fears. We are aware of inaccurate and largely undeserved folklore that result in eastern diamondbacks and other snakes being killed simply because they exist, or for adventure and excitement (Means 2009, p. 1).

Consideration of ongoing and projected climate change is a component of our analyses under the Act. Described in general terms, "climate change" refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or (Intergovernmental Panel on Climate Change (IPCC) 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species, and these may be positive or negative depending on the species and other relevant considerations, including interacting effects with existing habitat fragmentation or other non-climate variables.

Information provided in the petition concerning the potential for negative effects to the eastern diamondback rattlesnake from climate change presents compelling scenarios. However, there is no information in Service files concerning the eastern

diamondback and climate change.

Ecologists consider fire suppression to be the primary reason for the degradation of remaining longleaf pine forest habitat (Wolfe *et al.* 1988, p. 132). Prescribed burning is a significant part of many habitat management plans on private and public lands. However, the implementation of prescribed burning has been inconsistent due to financial constraints and limitations of weather (drought, wind direction, etc.) that restrict the number of opportunities to burn (Kaufman *et al.*, undated, pp. 2, 4–8) Many State and Federal lands use prescribed fire to restore and maintain fire-dependent plant communities and habitats as part of their respective management plans. This is usually beneficial to the eastern diamondback rattlesnake, as it is to other species that depend on fire dependent open-canopy pine forests for survival. Even though this action helps maintain and restore habitat necessary for the survival of the eastern diamondback, remaining suitable habitat is a fraction of the historical range. The prescribed burn programs of State and Federal lands, as well as some large tracts of private lands, improve and restore habitat important to the eastern diamondback, however much more fire management is needed to maintain and restore current and historical portions of its range. Additionally, fire management is often impeded by unsuitable weather, dangerous burn conditions, lack of funding, concern of adjacent landowners, or unwillingness to burn in difficult conditions because of safety issues. Often, prescribed fire management focuses more on reducing fuel loading and lessening the potential for wildfire than on maintaining high-quality areas with respect to habitat suitability for eastern diamondback rattlesnakes (Kaufman *et al.* undated, pp. 2, 4–8). In other words, there may simply not

be enough prescribed fire in terms of area or frequency to restore or maintain the open-canopy habitats on which the eastern diamondback depends.

In summary, the Service finds that the petition and information in our files does not provide substantial scientific or commercial information indicating that listing may be warranted due to the effects of pesticide use or snakes killed out of fear or for adventure. However, prescribed fire is one of the most important tools for restoration and maintenance of suitable habitat for the eastern diamondback rattlesnake. Based on the information available to this assessment, the limited area and frequency of prescribed fire occurring for restoration and maintenance of suitable habitat may pose a significant threat to the continued existence of the eastern diamondback. Additionally, new scientific information and modeling data cited in the petition are demonstrating that the eastern diamondback may not likely be able to adapt to the change and more importantly, the rate of change, in its habitat due to climate change.

Therefore, the Service finds that the information provided in the petition, as well as other information in our files, presents substantial scientific or commercial information indicating that the petitioned action may be warranted due to other natural or manmade factors.

## **Finding**

On the basis of our determination under section 4(b)(3)(A) of the Act, we

determine that the petition presents substantial scientific or commercial information indicating that listing the eastern diamondback rattlesnake throughout its entire range may be warranted. This finding is based on information provided under factors A, B, D, and E. We determine that the information provided under factor C is not substantial.

Because we have found that the petition presents substantial information indicating that listing the eastern diamondback rattlesnake may be warranted, we are initiating a status review to determine whether listing the eastern diamondback rattlesnake under the Act is warranted.

The “substantial information” standard for a 90-day finding differs from the Endangered Species Act’s “best scientific and commercial data” standard that applies to a status review to determine whether a petitioned action is warranted. A 90-day finding does not constitute a status review under the Act. In a 12-month finding, we will determine whether a petitioned action is warranted after we have completed a thorough status review of the species, which is conducted following a substantial 90-day finding. Because the Act’s standards for 90-day and 12-month findings are different, as described above, a substantial 90-day finding does not mean that the 12-month finding will result in a warranted finding.

## **References Cited**

A complete list of references cited is available on the Internet at

*http://www.regulations.gov* and upon request from the Panama City, FL, Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

**Author**

The primary authors of this notice are the staff members of the Panama City, FL, Ecological Services Office.

## Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Date: May 1, 2012

/s/ David L. Cottingham

*Acting Director, U.S. Fish and Wildlife Service*

~~**[Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List the Eastern Diamondback Rattlesnake as Threatened]**~~

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